Trend Study 16A-12-02

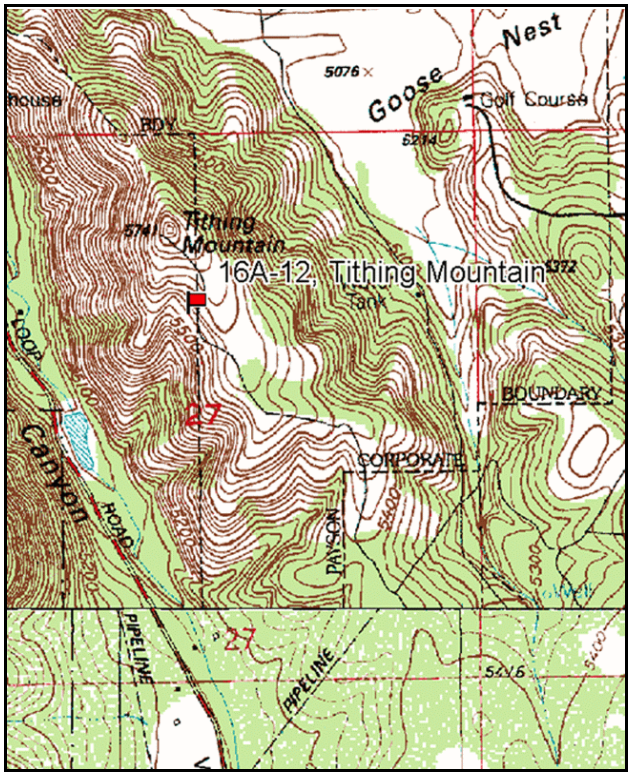
Study site name: Tithing Mountain . Vegetation type: Stansbury Cliffrose .

Compass bearing: frequency baseline 136 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

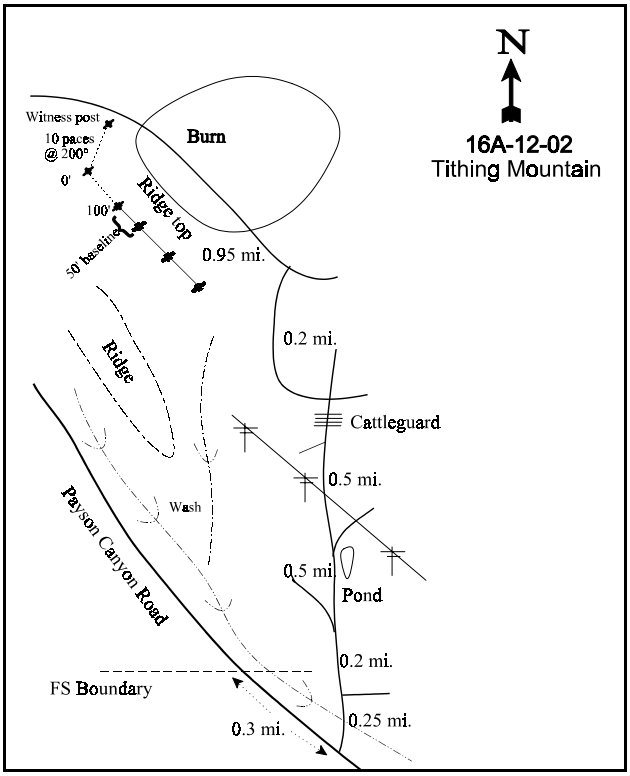
LOCATION DESCRIPTION

From the old Peteetneet school at 100 North and 600 East in Payson, head south on 600 East which turns into the Payson Canyon Road. Go 2.9 miles to a flood control basin and a wide spot in the road. Either park here, cross the creek, follow the pipeline south to the first draw, then walk approximately 1/2 mile northwest up this draw to the burn, the road and the transect; **OR** continue driving up the Payson Canyon Road another 1.6 miles to the Forest Service boundary. Go another 0.3 miles and take a rough dirt road on the left (north). Go another 0.25 miles to a side road. Stay straight (left) 0.1 miles further until you cross a cattle guard. Go 0.1 miles beyond the cattle guard until you come to an intersection. At the intersection, go straight for 0.5 miles passing a pond (where you stay left) and crossing beneath the powerlines to another fork in the road. Go straight (north) for another 0.5 miles to a 4-way intersection. Stay left (west) and go 0.2 miles to a 3-way intersection where you will turn right (west). Go 0.95 miles to a witness post/rock pile on the left side of the road. From here, the 0-foot baseline stake (marked by browse tag #9083) is 10 paces away at 200 degrees magnetic.



Map Name: Spanish Fork

Township 9S , Range 2E , Section 27



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4428846 N 440144 E

DISCUSSION

Tithing Mountain - Trend Study No. 16A-12

The Tithing Mountain study was established in 1989 on private land to monitor critical big game winter range in an area southeast of Payson, Utah. The ridge is occupied by a stand of cliffrose with an association of mountain big sagebrush and Gambel oak. Exposure at the site is to the southeast on a 14% slope at an elevation of 5,700 feet. There is no water available on the ridge, however there has been sign in the past of significant winter use by deer and elk. It appears that domestic sheep trail through the area. In 1997, there was only sign of light deer use on the area with a pellet group frequency of only 7%. This increased considerably in 2002 to 21%. A pellet group transect read along the study site baseline in 2002 estimated 68 deer and 3 elk days use/acre (167 ddu/ha and 8 edu/ha). Most of the deer pellet groups were from winter use but a few deer appear to use the area in the spring as well.

The stony clay loam soil is well drained and moderately shallow with an effective rooting depth estimated at almost 10 inches. Soil texture is a clay loam with a slightly acidic pH of 6.3. Cobble sized rocks are common throughout the soil profile. Runoff and erosion are low and there is good protective ground cover providing protection to the soil. The soil erosion condition classification was determined to be stable in 2002.

The key browse on the site is Stansbury cliffrose which produced 76% of the browse cover in 1997, increasing to 91% in 2002. The dominant cliffrose was infrequently encountered, but a fair sample of the largely mature, partly unavailable cliffrose population was obtained on the density plots in 1989 (466 plants/acre). The population appeared stable with an equal number of young and decadent plants counted that year. The young shrubs averaged 2.5 feet in height. Older cliffrose got up to 8 feet in height and had large branches broken down, possibly due to heavy snow in the past and/or big game browsing. The tall shrubs tended to be moderately to heavily hedged on the available portions. Population density increased by 39% in 1997, mostly due to the larger, more representative sample used that year. No young plants were sampled. Utilization was heavier with 61% of the cliffrose sampled displaying heavy use. Vigor was good and there were few decadent plants. Use remained heavy on available cliffrose in 2002, but vigor was normal on most plants and the number of decadent plants remained stable. Mountain big sagebrush is the only other preferred browse species found on the site. It occurs in small numbers, shows moderate to heavy use, and displays good vigor.

The herbaceous understory is abundant but in poor condition. It is dominated by annuals and low value perennial weeds. Cheatgrass and Japanese brome comprised 92% of the grass cover in 1997 with a combined cover value of 29%. In 2002, no Japanese brome was encountered, but cheatgrass still dominates the site by providing 73% of the grass cover. These fine fuels pose a significant fire hazard to the future survival of the non-sprouting key browse species, sagebrush and cliffrose. There is a limited amount of perennial grass cover, most of which is made up from the low value perennial, bulbous bluegrass. Forbs are common, diverse, and provide more cover than grasses. However, composition is extremely poor with annuals such as storksbill, bedstraw, and bur buttercup making up 65% of the forb cover in 2002. The perennial forb composition is also poor and composed mostly of weedy species. The highly undesirable invader, whitetop, is common and has increased significantly in its sum of nested frequency value since 1989. Other common perennial forbs include weedy species such as prickly lettuce and dandelion, both somewhat valued as forage by wildlife.

1989 APPARENT TREND ASSESSMENT

The soil appears to be in a stable condition. There is no evidence of significant erosion at the study site, although steeper slopes are highly eroded. The browse stand currently appears stable. A wildfire has the highest potential of severely disturbing the site. Ubiquitous and undesirable invader herbaceous species take over this range type after a fire. The area provides a limited amount of winter range.

1997 TREND ASSESSMENT

Trend for soil appears stable. Litter cover has declined, but percent bare ground has also decreased. The browse trend is stable. Cliffrose shows moderate to heavy use, but vigor is normal and percent decadence is low at 13%. Mountain big sagebrush also appears to have a stable population. The herbaceous understory is abundant, but totally dominated by annuals, producing a very poor composition. Since annuals were not included in the previous reading, no comparisons can be made. Trend for perennial grasses is stable but they are lacking. Trend for perennial forbs is considered up slightly due to an increase in sum of nested frequency values. However, nested frequency of the noxious weed, whitetop, also increased significantly. The high density of annual grasses makes a wildfire a distinct possibility in the future.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - up slightly, but in poor condition (4)

2002 TREND ASSESSMENT

Trend for soil continues to be stable. Protective ground cover is abundant leaving little unprotected bare ground. Trend for the key browse species, Stansbury cliffrose, is also stable. It displays moderate to heavy use on available plants, but vigor is normal on most and the number of decadent plants has remained stable. Reproduction is non-existent. Mountain big sagebrush also shows moderate to heavy use, good vigor, and low decadence. Trend for the herbaceous understory is stable. Japanese brome which was abundant in 1997, was not encountered in 2002. Cheatgrass is still abundant, producing 73% of the grass cover with a cover value of 16%. Cover and frequency of perennial grasses have increased but the improvement is due to a significant increase in the low value perennial, bulbous bluegrass. The forb portion of the herbaceous understory continues to be dominated by annual and perennial weeds. The invasive weed, whitetop, has increased significantly in nested frequency since 1997. It now provides 22% of the total forb cover. The abundant and weedy understory causes intense competition to the establishment of shrub seedlings and provides fine fuels for wildfire. A fire on this site will destroy the value of this area as big game winter range.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 16A, Study no: 12

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'89	'97	'02	'89	'97	'02	'97	'02
G	Agropyron spicatum	10	3	-	3	1	-	.03	-
G	Bromus japonicus (a)	-	b297	a-	-	86	-	15.63	-
G	Bromus tectorum (a)	-	300	267	-	91	82	12.92	15.48
G	Festuca myuros (a)	-	b47	a-	-	16	-	.18	-
G	Poa bulbosa	a-	b15	c104	-	7	39	1.45	5.55
G	Poa pratensis	5	5	3	2	2	1	.03	.00
G	Poa secunda	ab28	b30	a3	11	14	3	.74	.04
Total for Annual Grasses		0	644	267	0	193	82	28.74	15.48
Total for Perennial Grasses		43	53	110	16	24	43	2.26	5.59
Total for Grasses		43	697	377	16	217	125	31.01	21.08
F	Alyssum alyssoides (a)	-	b98	a16	-	37	6	.56	.05
F	Allium spp.	6	-	2	5	-	1	-	.00
F	Asclepias asperula	3	-	-	1	-	-	-	-
F	Cardaria draba	a49	b112	c188	18	43	67	4.88	7.82
F	Camelina microcarpa (a)	-	9	9	-	3	4	.04	.02
F	Calochortus nuttallii	-	-	2	-	-	1	.00	.00
F	Collinsia parviflora (a)	-	61	70	-	22	30	.30	.49
F	Cymopterus longipes	7	15	15	3	8	10	.11	.10
F	Epilobium brachycarpum (a)	-	b59	a9	-	26	4	.91	.04
F	Eriogonum brevicaule	-	-	11	-	-	4	-	.02
F	Erodium cicutarium (a)	-	a197	b229	-	69	77	4.78	10.46
F	Erigeron divergens	-	-	3	-	-	1	-	.15
F	Eriogonum ovalifolium	-	-	2	-	-	1	-	.03
F	Galium aparine (a)	a104	b140	c179	43	48	59	6.00	7.63
F	Helianthus annuus (a)	9	-	-	4	-	-	-	-
F	Holosteum umbellatum (a)	-	b67	a19	-	28	9	.28	.05
F	Lactuca serriola	b148	c204	a89	64	80	39	5.83	.86
F	Lomatium spp.	-	-	6	-	-	2	-	.06
F	Medicago sativa	-	2	-	-	1	-	.00	-
F	Microsteris gracilis (a)	-	9	-	-	3	-	.01	-
F	Montia perfoliata (a)	-	a-	b33	-	-	15	-	.22
F	Phlox longifolia	2	-	-	1	-	-	-	-
F	Polygonum douglasii (a)	-	3	5	-	1	2	.00	.01
F	Ranunculus spp.	a-	a-	b37	-	-	15	-	.41
F	Ranunculus testiculatus (a)	-	22	29	-	9	13	.09	.09
F	Taraxacum officinale	a3	b39	b61	1	17	26	1.21	2.37
F	Tragopogon dubius	a25	b62	a41	15	34	19	.62	.46

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'89	'97	'02	'89	'97	'02	'97	'02
F	Unknown forb-annual (a)	-	$_{a}$19	$_{b}$56	-	8	21	.38	3.12
F	Unknown forb-perennial	-	4	-	-	1	-	.38	-
F	Veronica biloba (a)	-	37	46	-	12	15	.57	.66
F	Zigadenus paniculatus	1	3	3	1	1	1	.00	.00
Total for Annual Forbs		113	721	700	47	266	255	13.96	22.86
Total for Perennial Forbs		244	441	460	109	185	187	13.05	12.32
Total for Forbs		357	1162	1160	156	451	442	27.02	35.18

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Herd unit 16A, Study no: 12

Type	Species	Strip Frequency		Average Cover %	
		'97	'02	'97	'02
B	Artemisia tridentata vaseyana	28	12	2.54	.66
B	Cowania mexicana stansburiana	32	26	13.96	14.17
B	Opuntia spp.	0	1	.03	.15
B	Purshia tridentata	1	0	-	-
B	Quercus gambelii	1	2	1.82	.53
Total for Browse		62	41	18.37	15.51

CANOPY COVER --
Herd unit 16A, Study no: 12

Species	Percent Cover	
	'97	'02
Artemisia tridentata vaseyana	-	.80
Cowania mexicana stansburiana	22	18
Quercus gambelii	1.2	-

Key Browse Annual Leader Growth
Herd unit 16A , Study no: 12

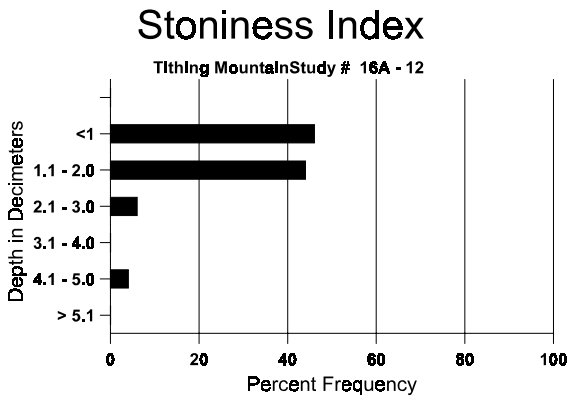
Species	Average leader growth (in)
	'02
Cowania mexicana stansburiana	0.8

BASIC COVER --
Herd unit 16A, Study no: 12

Cover Type	Nested Frequency		Average Cover %		
	'97	'02	'89	'97	'02
Vegetation	390	374	2.50	59.62	64.40
Rock	148	161	5.25	9.61	7.72
Pavement	108	77	.25	3.13	1.05
Litter	400	368	84.25	61.15	40.52
Cryptogams	6	-	.75	.06	0
Bare Ground	120	144	7.00	3.39	6.54

SOIL ANALYSIS DATA --
Herd Unit 16A, Study no: 12, Tithing Mountain

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
9.4	53.6 (12.4)	6.3	38.4	29.1	32.6	3.4	22.0	92.8	.6



PELLET GROUP FREQUENCY --
Herd unit 16A, Study no: 12

Type	Quadrat Frequency		Pellet Transect	
	'97	'02	Pellet Groups per Acre '02	Days Use per Acre (ha) '02
Rabbit	-	2	-	-
Elk	-	-	44	3 (8)
Deer	7	21	879	68 (167)
Sheep	-	-	44	3 (8)

BROWSE CHARACTERISTICS --
Herd unit 16A, Study no: 12

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
Y	89	8	-	-	-	-	-	-	-	-	8	-	-	-	266			8
	97	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	89	-	3	3	-	-	-	-	-	-	6	-	-	-	200	20	38	6
	97	11	1	1	3	-	2	-	-	-	18	-	-	-	360	24	37	18
	02	6	3	1	-	-	-	-	-	-	10	-	-	-	200	24	31	10
D	89	2	3	1	-	-	-	-	-	-	3	-	2	1	200			6
	97	2	-	2	-	-	-	-	-	-	3	-	-	1	80			4
	02	-	-	2	-	-	-	-	-	-	2	-	-	-	40			2
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	180			9
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	120			6

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	30%	20%	15%	- 7%
'97	03%	16%	03%	-61%
'02	25%	25%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	666	Dec:		30%
'97	620			13%
'02	240			17%

Cowania mexicana stansburiana																		
Y	89	1	1	1	-	-	-	-	-	-	3	-	-	-	100			3
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	89	2	2	1	-	2	1	-	-	-	8	-	-	-	266	56	58	8
	97	2	4	7	-	6	11	3	-	-	33	-	-	-	660	97	105	33
	02	-	1	5	-	2	9	5	2	-	23	-	-	1	480	87	89	24
D	89	-	1	1	-	1	-	-	-	-	3	-	-	-	100			3
	97	-	-	4	-	-	1	-	-	-	2	-	-	3	100			5
	02	-	-	-	-	-	-	4	1	-	2	-	-	3	100			5
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	50%	29%	00%	+39%
'97	26%	61%	08%	-24%
'02	10%	48%	14%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	466	Dec:		21%
'97	760			13%
'02	580			17%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3	7	1
% Plants Showing			Moderate Use			Heavy Use			Poor Vigor						%Change			
		'89		00%			00%			00%								
		'97		00%			00%			00%								
		'02		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)													'89		0	Dec:		-
													'97		0			-
													'02		20			-
Purshia tridentata																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	1	-	-	-	-	1	-	-	-	20	-	-	1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing			Moderate Use			Heavy Use			Poor Vigor						%Change			
		'89		00%			00%			00%								
		'97		100%			00%			00%								
		'02		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)													'89		0	Dec:		-
													'97		20			-
													'02		0			-
Quercus gambelii																		
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	3	-	-	3	-	-	-	-	-	6	-	-	-	120			6
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80	37	39	4
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	72	56	0
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	1	-	-	-	-	-	-	-	-	-	-	1	-	20			1
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
% Plants Showing			Moderate Use			Heavy Use			Poor Vigor						%Change			
		'89		00%			00%			00%								
		'97		00%			00%			00%						+43%		
		'02		00%			00%			14%								
Total Plants/Acre (excluding Dead & Seedlings)													'89		0	Dec:		0%
													'97		80			0%
													'02		140			14%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Rosa woodsii																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	73	91	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'89	00%	00%	00%
'97	00%	00%	00%
'02	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
'89	0	Dec:		-
'97	0			-
'02	0			-